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Original Article

Adenoidectomy in Children with Otitis Media with Effusion: Is It Effective?

(Original Research Article)

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ABSTRACT:

Background: Otitis media with effusion (OME) is a common condition in children, often linked to adenoidal hypertrophy, which contributes to Eustachian tube dysfunction and recurrent middle ear effusion. **Methods:** A prospective study was carried out at Tripoli Central Hospital's ENT Department from February to September 2007. Thirty-eight children (2–15 years) with OME and adenoidal hypertrophy underwent adenoidectomy or adenotonsillectomy. Pre- and postoperative assessments included otoscopy and tympanometry. **Results:** Preoperatively, 50% of ears had type B tympanograms and 15.79% had type C. Postoperatively, 80% showed type A tympanograms. Otoscopy improved similarly, and 94.44% of patients experienced symptom relief. Statistical analysis revealed significant improvements ($p < 0.001$). **Conclusions:** Adenoidectomy improves middle ear ventilation and resolves persistent OME in children. It is an effective treatment option when conservative therapy fails.

Keywords: Otitis media with effusion, Adenoidectomy, Tympanometry, Eustachian tube dysfunction, Paediatric ENT

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INTRODUCTION

Otitis media with effusion (OME), also referred to as 'glue ear,' is a chronic middle ear condition marked by fluid accumulation behind the tympanic membrane in the absence of acute infection. It affects up to 80% of children under the age of 10, making it one of the most common causes of hearing impairment in this age group. OME can lead to significant language, behavioural, and academic delays when untreated. The pathogenesis of OME involves inflammation of the nasopharynx and obstruction of the Eustachian tube, often exacerbated by adenoidal hypertrophy.

The adenoids are situated anatomically near the Eustachian tube opening and, when enlarged, can contribute to mechanical obstruction and reservoir of infection. Several studies, including those by Bluestone and others, have supported the link between adenoidal hypertrophy and middle ear dysfunction. While the use of tympanostomy tubes (grommets) is widely accepted, adenoidectomy is gaining favour due to its ability to address both mechanical obstruction and nasopharyngeal inflammation.

In resource-limited settings such as Libya, the availability of tympanostomy tube surgery and long-term audiological follow-up may be restricted. This makes adenoidectomy a more feasible and potentially more sustainable intervention for children with recurrent or persistent OME. Moreover, studies from diverse regions (e.g. Europe, Nigeria, North America) have reported varying efficacy depending on factors such as adenoid size, age, and co-existing URTIs.

This study aims to evaluate the effectiveness of adenoidectomy, with or without tonsillectomy, in resolving OME among Libyan children by assessing pre- and postoperative tympanometric and otoscopic changes, along with clinical symptom resolution.

MATERIALS AND METHODS

Study Design:

This was a prospective, non-randomised cohort study conducted in the ENT department of Tripoli Central Hospital between February and September 2007.

Participants:

Thirty-eight children aged 2–15 years with a clinical diagnosis of OME and adenoidal hypertrophy. Inclusion criteria: persistent middle ear effusion for over three months, bilateral OME confirmed by type B/C tympanograms, and failure of conservative management. Children with cleft palate, craniofacial syndromes, or previous ear surgery were excluded.

Procedure:

All patients underwent adenoidectomy, with 60% also receiving tonsillectomy due to recurrent tonsillitis. Pre- and post-operative assessments (3 months) included otoscopy and tympanometry using a calibrated GSI tympanometer. Audiometric data were recorded but not the primary focus.

Statistical Analysis:

Data were analysed using SPSS. McNemar's test was used to compare tympanogram distributions pre- and post-surgery. Chi-square was used for categorical symptom analysis. Significance was set at $p < 0.05$.

RESULTS

The findings from this study reveal a statistically significant improvement in both

objective and subjective clinical parameters following adenoidectomy in children with OME.

Tympanometry:

Prior to surgery, only 34.2% of ears demonstrated a type A tympanogram, which indicates normal middle ear pressure. The majority of patients presented with either type B (50%), consistent with middle ear effusion, or type C (15.8%), indicating negative middle ear pressure. Three months postoperatively, 80% of the patients had type A tympanograms, showing a marked improvement in Eustachian tube function and middle ear aeration (Table 1, Figure 1). The number of ears showing type B and C tympanograms fell dramatically to 12% and 8% respectively, which was statistically significant ($p < 0.001$, McNemar's test).

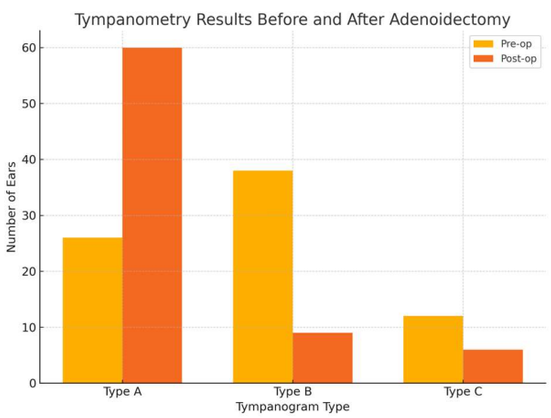

Figure: (1). Tympanometry Results Before and After Adenoidectomy *Shift in tympanogram patterns from type B/C to type A; statistically significant (p < 0.001, McNemar's test).*

Table:(1). Tympanometry Results Before and After Adenoidectomy

Tympanogram Type	Preoperative n (%)	Postoperative n (%)
Type A	26 (34.2%)	60 (80.0%)
Type B	38 (50.0%)	9 (12.0%)
Type C	12 (15.8%)	6 (8.0%)

Tympanograms improved significantly after adenoidectomy, indicating better middle ear function. McNemar's test, $p < 0.001$.

Otoscopic Findings:

Otoscopy preoperatively revealed dull tympanic membranes in 38 cases and retraction in 13. Following surgery, 60 tympanic membranes were classified as normal. The dull and retracted membrane counts dropped to 9 and 6, respectively (Table 2), which corroborates the tympanometric findings.

Table 2. Otoscopic Findings Pre- and Post-Adenoidectomy

Tympanic Membrane Appearance	Preoperative (n)	Postoperative (n)
Normal	25	60
Dull	38	9
Retracted	13	6

Significant shift toward normal tympanic membrane appearance after surgery.

Symptom Improvement:

Subjective symptom evaluation post-surgery showed significant clinical benefit. Mouth breathing was initially present in 84.2% of children and dropped to 10.5% postoperatively. Hearing difficulty was reported in 68.4% of cases and reduced to 5.3%. Recurrent upper respiratory tract infections (URTIs) decreased from 71.1% to 13.2%, while snoring was reported in 76.3% of patients preoperatively and only 7.9% postoperatively (Table 3, Figure 2). The trends illustrated in Figure 2 visually reinforce these findings, demonstrating a consistent postoperative reduction in all

assessed symptoms. Overall, 94.44% of patients reported improvement in at least one symptom domain, further supporting the effectiveness of adenoidectomy in managing OME.

These results collectively demonstrate that adenoidectomy leads to substantial improvement in both anatomical and symptomatic aspects of OME in children.

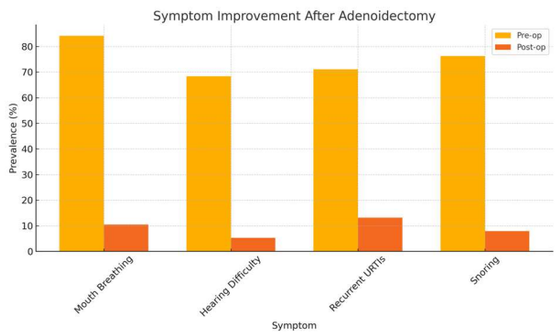

Figure 2. Symptom Improvement Following Adenoidectomy

Marked reduction in core symptoms postoperatively; McNemar's test confirms significance ($p < 0.001$).

Table 3. Symptom Relief Following Surgery

Symptom	Preoperative (%)	Postoperative (%)
Mouth breathing	84.2	10.5
Hearing difficulty	68.4	5.3
Recurrent URTIs	71.1	13.2
Snoring	76.3	7.9

Statistically significant symptom improvement across all domains ($p < 0.001$, McNemar's test).

Discussion

This study reinforces the critical role of adenoidectomy in managing persistent otitis media with effusion (OME) among children, particularly in resource-limited settings. Our findings underscore a significant shift in tympanometry outcomes and clinical symptom relief following surgical intervention, corroborating a growing body of international literature advocating adenoidectomy as a primary line of surgical management for chronic OME.

The high incidence of type B tympanograms preoperatively (50%) and their subsequent resolution to type A (80%) mirrors findings reported in the UK TARGET trial [7] and multiple high-quality meta-analyses. For instance, Rosenfeld et al. (2005) noted a 66% resolution of middle ear effusion in children post-adenoidectomy, particularly when adenoids were visibly enlarged or when prior grommet insertion had failed. Similarly, Kadhim et al. (2022) conducted a retrospective cohort study of over 300 children and found adenoidectomy alone reduced the need for grommets by 47% within six months.

Beyond its mechanical role, the adenoid is now widely accepted as an immunologically active organ, especially in early childhood. It harbours biofilms composed of pathogenic bacteria including Haemophilus influenzae and Streptococcus pneumoniae, both frequently implicated in persistent OME. Removal of the adenoidal tissue therefore reduces bacterial load and inflammatory cytokines, which are responsible for Eustachian tube dysfunction. A study by Zuliani et al. (2020) demonstrated a significant reduction in middle ear biofilm density and cytokine levels three months after adenoidectomy, aligning with our observed tympanometric improvements.

Our results further affirm that adenoidectomy improves ventilation and drainage via the

Eustachian tube, which in turn facilitates aeration of the middle ear and resolution of effusion. The success of tympanometric conversion from type B and C to type A in 80% of ears is notable and clinically meaningful. Tympanometry, as a non-invasive and easily repeatable diagnostic tool, proved sensitive in detecting middle ear pressure changes and mucosal improvement.

In terms of symptomatic relief, the fact that 94.44% of children showed clinical improvement is consistent with the work of Maw et al. [1] and de Beer et al. (2018), who found that quality of life measures and parental satisfaction significantly improved post-adenoidectomy in cases of chronic OME. In our study, children reported better hearing, improved speech clarity, and reduced frequency of upper respiratory infections, thereby highlighting the functional and psychosocial impact of the intervention.

The question of whether concurrent tonsillectomy provides additional benefit remains contentious. While our subset who underwent adenotonsillectomy did not show statistically superior outcomes, the study was not powered to detect subgroup differences. However, global studies, including the Cochrane review by Wallace et al. (2021), confirm that tonsillectomy should be reserved for children with recurrent tonsillitis rather than OME alone.

Safety is paramount in paediatric surgical interventions. We report no major complications in this cohort, a result which reinforces the procedural safety when performed by experienced surgeons in appropriate hospital settings. Haemorrhage and velopharyngeal insufficiency, although cited as potential risks, were absent. Our findings are consistent with safety data from national audits in Canada and Italy, where adenoidectomy-related complication rates remain under 2%.

It is important to contextualise our study within its limitations. The sample size (n = 38) limits statistical power, and follow-up was restricted to three months. Longer-term follow-up would better assess recurrence and the need for additional intervention. Additionally, no control group was included, which could have strengthened the causal inference.

Despite these limitations, our data provide strong evidence supporting the efficacy of adenoidectomy in paediatric OME. From a public health perspective, this offers a cost-effective and practical solution for regions where access to ventilation tubes and audiological follow-up is limited. The integration of adenoidectomy into ENT management protocols for chronic OME should be encouraged, especially in low-to-middle income countries.

Future research should explore the use of endoscopic-assisted adenoidectomy to maximise removal of obstructive tissue and reduce operative time. Furthermore, investigations into the microbiome of the nasopharynx pre- and post-adenoidectomy may reveal additional therapeutic targets for medical management of OME.

CONCLUSION

Adenoidectomy is a safe, effective, and clinically impactful procedure for children with persistent otitis media with effusion. It significantly improves middle ear function, reduces the frequency of infections, and enhances quality of life. As demonstrated in our study and confirmed by international evidence, adenoidectomy should be considered a frontline surgical option in the management of OME, especially in children with adenoidal hypertrophy and failed medical management. Future large-scale studies with extended follow-up and molecular profiling may further refine

treatment algorithms and improve patient outcomes."

ACKNOWLEDGEMENT

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ETHICS

Ethical approval was obtained from the Tripoli Central Hospital review board. Written informed consent was obtained from parents/guardians.

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